Climate change in Southern Ural according to the Lake Bannoe sediments investigations

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The work is devoted to studying the climate change in last millennia in South Ural on the basis of geochemical and petromagnetic data. The object of research is sediments of Bannoe lake sediments, which is located in republic of Bashkortostan (55°35′48″N 58°37′47″ E). The average depth of the lake is 10.6 m, the maximum depth of the lake is 28 m, length 4.17 km, average width 1.88 km. The surface area of the lake is 7.7 km^2.

Four cores from 3.8-5.14 m long were taken based on seismoacoustic data. Core samples were cut into 2 cm.

For constructing comprehensive paleoenvironmental reconstructions radiocarbon ages of 9 samples from core №3 were determined in the Department of Geosciences of the National Taiwan University (NTUAMS 14C-dating Lab). According the results the age of investigated deposits is Holocene-Pleistocene. For studying climate changes were measured magnetic properties and elemental composition of sediments.

Magnetic susceptibility (MS) was measured using a Multifunction Kappabridge MFK1-FA (AGICO), hysteresis parameters were obtained using the J_meter coercitive spectrometer, and it allows separate measurements of the remanent and induced magnetizations in magnetic fields up to 1.5 T at room temperature, induced magnetization versus temperature. Also element composition of each 5th (10 cm) sample was measured on Bruker S8 Tiger X-ray Fluorescence spectrometer. The output values were corrected with loss on ignition parameter, which was determined through heating samples at 1100 °C for about 2h.

Magnetic susceptibility varies between 0.88 - 7.87·10^{-7} м^3/kg for all cores. The lower part of cores are characterised the largest changes of MS, which indicates a significant change in climatic conditions. Almost all magnetic fractions are presented by pseudo-single domain particles, according hysteresis parameters.

Decomposition of coercitive spectras into para-, ferro-, syperparamagnetic components also gives a lot of information about conditions during sedimentation. Thus, variations of the paramagnetic component reflect the relative growth of material input into the sedimentation basin, as well as the hydrogeological regime of the lake. The ferrimagnetic components of the sediments can be allothigenic and authigenic.

The higher values of MS, paramagnetic component and lithophilic elements (such us Na, K, Al, Si) and lower values of organic matter in lower part of the section displays the beginning of lake accumulation (12691-9963 years) in Late Pleistocene. According to data of chemical weathering intensity, an increase of the weathering is observed between 7908-7343 years (Atlantic), 4750-3998 years (Subboreal), and a decrease of the weathering is appeared between 9963-7908 years (Boreal), 7343-4750 years (Atlantic), 3998 - 892 years (Subboreal and Subatlantic).